



**North
Atlantic**

North Atlantic Energy Service Corporation
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The Northeast Utilities System

January 18, 1999

Docket No. 50-443

NYN-99004

AR#98022101

ACR 98-3663

AR#98022053

United States Nuclear Regulatory Commission
Attention: Document Control Desk
Washington, DC 20555

Seabrook Station
Licensee Event Report (LER) 98-014-00
Reactor Trip Due to Pole Disagreement on 345 kV Breaker

Enclosure 1 is Licensee Event Report (LER) 98-014-00 for an event that occurred at Seabrook Station on December 22, 1998. This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv). Enclosure 2 is a list of North Atlantic Energy Service Corporation (North Atlantic) commitments made in response to this LER.

Should you require further information regarding this matter, please contact Mr. Terry L. Harpster, Director of Licensing Services at (603) 773-7765.

Very truly yours,

NORTH ATLANTIC ENERGY SERVICE CORP.



Ted C. Feigenbaum
Executive Vice President and
Chief Nuclear Officer

cc: H. J. Miller, NRC Regional Administrator
J. T. Harrison, NRC Project Manager, Project Directorate 1-3
R. K. Lorson, NRC Senior Resident Inspector

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PDR ADDCK 05000443
S PDR

ENCLOSURE 1 TO NYN-99004

EXPIRES 04/30/98

LICENSEE EVENT REPORT (LER)

(See reverse for required number of
digits/characters for each block)ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY
INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS
LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED
BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN
ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-
6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC
20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104),
OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)

Seabrook Station

DOCKET NUMBER (2)

05000443

PAGE (3)

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TITLE (4)

REACTOR TRIP DUE TO POLE DISAGREEMENT ON 345 kV BREAKER

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	22	98	98	014	00	01	18	99	FACILITY NAME	DOCKET NUMBER
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)							
POWER LEVEL (10)		100	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		50.73(a)(2)(viii)	
			20.2203(a)(1)		20.2203(a)(3)(i)		50.73(a)(2)(ii)		50.73(a)(2)(x)	
			20.2203(a)(2)(i)		20.2203(a)(3)(ii)		50.73(a)(2)(iii)		73.71	
			20.2203(a)(2)(ii)		20.2203(a)(4)		50.73(a)(2)(iv)		OTHER	
			20.2203(a)(2)(iii)		50.36(c)(1)		50.73(a)(2)(v)		Specify in Abstract below or in NRC Form 366A	
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)			

LICENSEE CONTACT FOR THIS LER (12)

NAME

James M. Peschel, Regulatory Compliance Manager

TELEPHONE NUMBER (Include Area Code)

(603) 773-7194

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS
B	FK	BKR	A500	N					
X	EA	RLY	GO80	N					

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On December 22, 1998, at 0827 EST, an automatic reactor trip occurred while at 100 percent power. The reactor trip was initiated due to a turbine trip which occurred upon loss of load when the main generator breaker was opened as a result of a pole disagreement in 345 kV breaker 163. Bus 4 failed to transfer from the Unit Auxiliary Transformer to the Reserve Auxiliary Transformer. Additionally, a voltage transient on Buses 5 and 6 caused some safety related and non-safety related equipment to trip or stop.

This event was caused by an auxiliary switch linkage pin in breaker 163 that fell out preventing the linkage from actuating the auxiliary contact thereby causing the pole disagreement when the breaker was opened.

The breaker 163 auxiliary switch linkage pin that fell out was reinstalled with new retaining clips. The eleven remaining auxiliary switch link pins and associated clips were verified to be installed on breaker 163. The remaining seven 345 kV breakers were visually inspected and it was verified that the auxiliary switch linkage pins and their associated clips were in place. The 345 kV breakers will be inspected periodically to ensure the auxiliary switch linkage pins and their associated clips are in place.

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TEXT (If more space is required, use additional copies of NRC Form 366A) (17)

I. Description of Event

On December 22, 1998, at 0827 EST, an automatic reactor trip occurred while at 100 percent power. The reactor trip was initiated due to a turbine trip which occurred upon loss of load when the main generator breaker [EL] was opened as a result of a pole disagreement in 345 kV breaker 163 [FK].

The event occurred when breaker 163 was opened for routine offsite line maintenance. All three poles opened but the auxiliary switch for pole "C" did not actuate. This caused a pole disagreement to be detected in breaker 163. The breaker failure circuitry then sent trip signals to 345 kV breakers 11, 632, the main generator breaker, the six Unit Auxiliary Transformer (UAT) [EA] feeder breakers for Buses 1 through 6, and other miscellaneous breakers. This resulted in a loss of turbine load and caused a turbine trip and subsequent reactor trip. It also initiated a UAT to Reserve Auxiliary Transformer (RAT) [EA] transfer on Buses 1 through 6 as expected when the UAT supply breakers trip. (Refer to Figure in LER Section V).

The plant tripped as designed and station buses transferred to the RAT on the loss of the UAT supply with the exception of 4160V Bus 4, which did not properly transfer to the RAT. Bus 4 does not supply risk significant loads other than the Startup Feedwater Pump [BA]. As a result, the Startup Feedwater Pump did not automatically start, however, it was capable of being manually started via its alternate feed from safety related Bus 5, if necessary. The electric and turbine driven Emergency Feedwater Pumps [BA] automatically started to provide sufficient emergency feedwater.

During this event, a voltage transient on Buses 5 and 6 caused some safety related and non-safety related equipment to trip and not restart when power was restored. While unexpected, this was consistent with plant design given such a transient. The safety related equipment that was operating at the time of the event that tripped and did not restart included the Control Room Makeup Air Fan CBA-FN-27B [VI], Spent Fuel Pool Cooling Pump SF-P-10B [DA], Train-A Switchgear Area Supply and Return Air Fans CBA-FN-19, 20, 32 and 33 [VI], and Containment Particulate Radiation Monitor isolation valves CAH-FV-6572, 6573, and 6574 [IK].

The Loose Parts Monitor (LPM) [II] was one of the non-safety related loads that tripped as a result of the voltage transient. The LPM powers the acoustic alarm which indicates actuation of the Power Operated Relief Valves (PORV) and the pressurizer safety valves [AB]. As a result, an alarm indicating that a PORV or a pressurizer safety valve was open occurred during the transient. Operators believed that a PORV had momentarily opened due to the lack of other indications confirming a valve was open. Subsequently, it was determined that a PORV did not open and that the alarm was due to the loss power to the LPM. The loss of the above described equipment and other non-safety related equipment as a result of the voltage transient on Buses 5 and 6 did not adversely affect the response to the reactor trip.

The response to the reactor trip and the subsequent recovery actions by plant operators were determined to be correct. Primary plant system response was normal with expected Engineered Safety Feature (ESF) actions (Emergency Feedwater System [BA] actuation on Steam Generator LO-LO level and Feedwater System [SJ] Isolation in response to the reactor trip). Per design, the emergency diesel generators did not start since Buses 5 and 6 were reenergized by the RAT supply within 1.2 seconds. As necessary, plant operators successfully restarted/reenergized equipment that had tripped off or stopped due to the voltage transient on the buses.

At 0925 EST on December 22, 1998, this event was reported to the NRC pursuant to 10 CFR 50.72(b)(2)(ii) since it resulted in a Reactor Protection System (RPS) and an ESF actuation.

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II. Cause of Event

This event was caused by an auxiliary switch link pin in breaker 163 that fell out preventing the linkage from actuating the auxiliary contact thereby causing a pole disagreement when the breaker was opened. The pin is held in place by retaining clips at each end. One of the retaining clips was missing allowing the pin to work its way out of the mechanical linkage. The pin with one installed retaining clip was found on the bottom of the breaker cabinet. The other retaining clip was also found in the bottom of the cabinet. There was no visible evidence to explain how the clip may have become dislodged. The most probable failure mechanism is the improper installation of the retaining clip.

The most probable cause of the failure of Bus 4 transfer from the UAT to the RAT is misoperation of the residual voltage bus relay possibly due to mechanical binding from inactivity. It was not possible to recreate this condition during troubleshooting. It is believed that the potential for any binding was eliminated when the relay was cycled during troubleshooting activities.

Another potential cause for the failure of Bus 4 to transfer is a voltage transient. The design of the station bus transfer schemes is such that when the UAT supply breaker to the bus opens an automatic transfer to the RAT supply occurs if the RAT supply is in synchronism with the bus. If the RAT supply is not in synchronism with the bus, then a transfer is allowed when the bus voltage decays to the residual bus voltage setpoint or approximately 25 percent of the rated voltage. If the RAT breaker has not closed 1.2 seconds after transfer initiation, then the motors on the bus are tripped and the automatic transfer circuitry is disabled to prevent inadvertent RAT breaker closure. The Bus 4 transfer could have been blocked if a voltage transient existed which did not allow the bus voltage to decay fast enough to operate the residual relay before the 1.2 second timer expired. North Atlantic does not have any data to confirm or refute the presence of such a voltage transient, however it is known that the 1.2 second timer had expired for Bus 4.

The loss of some safety and non-safety related loads as a result of the voltage transient on Buses 5 and 6, while unexpected, was consistent with plant design.

III. Analysis of Event

There were no adverse safety consequences as a result of this event. The plant responded as designed with the exception of the UAT to RAT transfer for Bus 4. Operations personnel properly responded to the reactor trip and subsequent recovery actions.

The failure of the fast transfer circuitry for Bus 4 did not result in any adverse consequences. There are no risk significant loads on Bus 4 except for the Startup Feedwater Pump, which has an alternate feed from Bus 5. Additionally, Bus 4 could have been immediately re-energized by closing the RAT breaker if necessary. The Startup Feedwater Pump was not required to be manually started via its alternate feed from Bus 5 since the electric and turbine driven Emergency Feedwater Pumps automatically started to provide sufficient emergency feedwater. Operators subsequently successfully reenergized Bus 4.

The Water Treatment Plant [KJ] is a non-safety related load on Bus 4 that was rendered inoperable by the failure of the Bus 4 fast transfer. This complicated post trip recovery actions since this system provides makeup water to the Condensate Storage Tank (CST) [KA]. CST water level decreased to approximately 264K gallons but remained above its Technical Specification limit of 212K gallons thereby ensuring adequate supply for the electric and turbine driven emergency feedwater pumps. However, this is below the 300K gallon limit necessary to start the Startup Feedwater

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Pump. Hence, this pump could not be started on the CST and then swapped to the condenser hotwells until Water Treatment System operation was restored and CST level recovered to at least 300K gallons and thus delayed realignment of the Emergency Feedwater System.

The voltage transient on Buses 5 and 6 that caused some safety related and non-safety related equipment to trip and not restart also did not cause any adverse safety consequences. An evaluation of the safety related loads that did not restart following the plant trip determined that sufficient time existed for operators to manually restart/repower these loads. Plant operators successfully restarted/reenergized equipment that had tripped off or stopped due to the voltage transient on the buses, as necessary. Additionally, in the case of the Containment Particulate Radiation Monitor isolation valves that lost power, these solenoid valves failed closed to the safe position. This is the same as the response to a loss of power or loss of power with Safety Injection. Separate redundant Class 1E radiation monitors are located inside the containment building to perform monitoring under accident conditions.

IV. Corrective Action

1. The breaker 163 auxiliary switch linkage pin that fell out was reinstalled with new retaining clips. The eleven remaining auxiliary switch link pins and associated clips were verified to be installed on breaker 163.
2. The remaining seven 345 kV breakers were visually inspected and it was verified that the auxiliary switch linkage pins and their associated clips were in place.
3. The 345 kV breakers will be inspected periodically to ensure the auxiliary switch linkage pins and their associated clips are in place.
4. North Atlantic will evaluate the applicability of a new ABB auxiliary switch linkage pin design.
5. Electrical Maintenance Department personnel will review the evaluation of this event.

V. Additional InformationSimilar Events

This is the second event at Seabrook Station where an auxiliary switch link pin fell out in breaker 163 thereby causing a pole disagreement when the breaker was opened. The prior event occurred in April 1990, which was prior to power operation, and it caused the Scobie Pond line to trip. As a result, it did not cause a turbine trip or reactor trip and it was not reported pursuant to 10 CFR 50.72 or 50.73. The prior event was caused by retaining clips not being installed or being improperly installed. Retaining clips for poles "A" and "C" were found to be missing. A link pin for pole "C" had fallen out. The link pin and retaining clips were installed as corrective actions.

Additionally, as documented in LER 91-008-00, North Atlantic has experienced a reactor trip due to the opening of 345 kV breakers. However, this prior event is unrelated since it was due to a manufacturing error in the relay housing contact block assembly on a 345 kV breaker failure protection relay.

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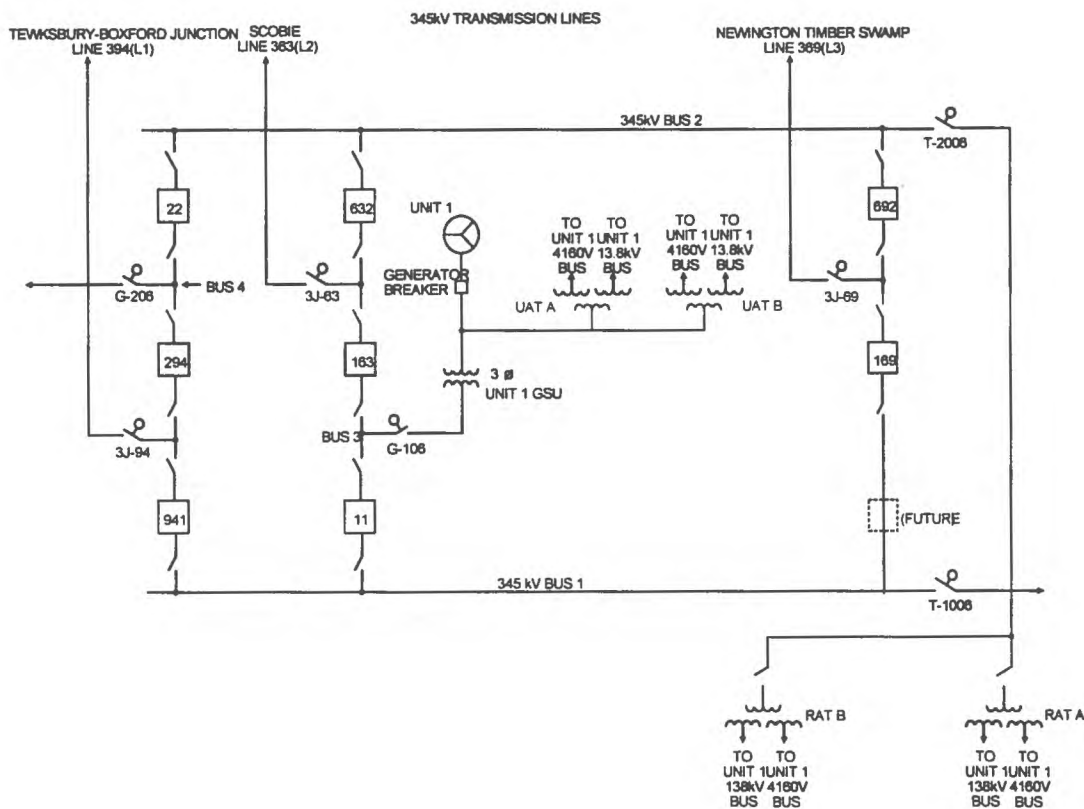
Manufacturer Data

345 kV breaker 163: ABB Model 362GB

Bus 4 Residual Voltage (Undervoltage) Relay: GE Model HGA14AR22A

Figure

345 kV Switching Station One-Line Diagram



ENCLOSURE 2 TO NYN-99004

North Atlantic Commitments Contained in NYN-99004

Description of Commitment

- | | |
|-----------------------|---|
| AR#98022053-02 | The 345 kV breakers will be inspected periodically to ensure the auxiliary switch linkage pins and their associated clips are in place. |
| AR#98022053-03 | North Atlantic will evaluate the applicability of a new ABB auxiliary switch linkage pin design. |
| AR#98022053-04 | Electrical Maintenance Department personnel will review the evaluation of this event. |

CATEGORY 1

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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SUBJECT: Forwards LER 98-014-00 for event that occurred at Seabrook Station on 981222. Encl 2 list of util commitments made in response to LER.

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